

CLAIMS

We claim:

1. An apparatus for measuring a step height of a sample, said apparatus comprising:

5 a light source providing a light beam for an interferometer and a light beam for an ellipsometer;

interferometer optics for directing said light beam for an interferometer to reflect off a sample;

10 ellipsometer optics for directing said light beam for an ellipsometer to reflect off said sample; and

a detector element for receiving the reflected light beam for an interferometer and the reflected light beam for an ellipsometer.

2. The apparatus of claim 1, wherein the light source is a laser that generates a monochromatic light beam.

15 3. The apparatus of claim 1, wherein the light source comprises at least one lamp.

4. The apparatus of claim 1, wherein said light source produces a single light beam, said apparatus further comprising a beam splitter that splits said single light beam into said light beam for an interferometer and said light beam for an ellipsometer.

20 5. The apparatus of claim 1, wherein said light source produces a single light beam, said apparatus further comprising a moveable mirror that directs said single light beam to be said light beam for an interferometer and said light beam for an ellipsometer.

25 6. The apparatus of claim 1, wherein said light source produces a single light beam, said apparatus further comprising an optical coupler that divides said single light beam to be said light beam for an interferometer and said light beam for an ellipsometer.

7. The apparatus of claim 1, wherein said light source simultaneously produces both said light beam for an interferometer and said light beam for an ellipsometer.

8. The apparatus of claim 1, wherein said apparatus further comprises a beam splitter to direct both said reflected light beam for an interferometer and said reflected light beam for an ellipsometer to said detector element.

9. The apparatus of claim 1, wherein said apparatus further comprises an optical coupler to direct both said reflected light beam for an interferometer and said reflected light beam for an ellipsometer to said detector element.

10. The apparatus of claim 1, wherein said interferometer optics and said ellipsometer optics share at least one polarizer.

11. The apparatus of claim 1, wherein said interferometer optics and said ellipsometer optics share at least one analyzer.

12. The apparatus of claim 1, wherein at least one of said light beam for an interferometer and said light beam for an ellipsometer pass through a variable retarder.

13. A metrology tool with an interferometer and an ellipsometer, said metrology tool comprising:

- means for producing a light beam for an interferometer;
- means for producing a light beam for an ellipsometer;
- interferometer optics for directing said light beam for an interferometer onto a sample;
- ellipsometer optics for directing said light beam for an ellipsometer onto a sample; and
- a means for receiving and detecting both the reflected light beam for an interferometer and the reflected light beam for an ellipsometer.

14. The metrology tool of claim 13, wherein said means for producing a light beam for an interferometer and said means for producing a light beam for an ellipsometer is a single light source that produces said light beam for an interferometer and said light beam for an ellipsometer.

15. The metrology tool of claim 14, said single light source produces a single light beam and wherein said means for producing a light beam for an interferometer and

said means for producing a light beam for an ellipsometer is a single light source further includes a beam splitter for splitting said single light beam into said light beam for an interferometer and said light beam for an ellipsometer.

16. The metrology tool of claim 13, wherein said means for receiving and
5 detecting both the reflected light beam for an interferometer and the reflected light beam for an ellipsometer is a single detector element.

17. A method of measuring the step height of a sample, said method comprising:

10 producing a light beam
directing said light beam into an interferometer path;
directing said light beam into an ellipsometer path;
reflecting the light beam for an interferometer off said sample;
reflecting the light beam for an ellipsometer off said sample; and
15 receiving the reflected light beam for an interferometer and the reflected
light beam for an ellipsometer at the same detector element.

18. The method of Claim 17, wherein producing said light beam for an
interferometer and said light beam for an ellipsometer comprises:

20 providing a single light beam from a light source; and
splitting said single light beam from said light source into said light beam
for an interferometer and said light beam for an ellipsometer.

19. The method of Claim 17, wherein producing said light beam for an
interferometer and said light beam for an ellipsometer comprises combining light having
25 a first set of wavelengths from a first lamp in a light source with light having a second set
of wavelengths from a second lamp in said light source.

20. An apparatus for measuring a step height of a sample, said apparatus comprising:

30 a light source;
a polarizer to polarize a light beam emitted from said light source;

said light beam providing a light beam for an interferometer and a light beam for an ellipsometer;

interferometer optics disposed to receive said light beam for an interferometer and direct said light beam for an interferometer to reflect off said sample;

ellipsometer optics disposed to receive said light beam for an ellipsometer and direct said light beam for an ellipsometer to reflect off said sample;

an analyzer disposed downstream of said interferometer optics and ellipsometer optics to analyze said light beam for an interferometer and said light beam for an ellipsometer after being reflected off said sample; and

a detector element for receiving the light beam for an interferometer and the light beam for an ellipsometer after passing through the analyzer.

21. The apparatus of claim 20, further comprising a beam splitter that splits said single light beam into said light beam for an interferometer and said light beam for an ellipsometer.

22. The apparatus of claim 20, further comprising a movable mirror that directs said single light beam to be said light beam for an interferometer and said light beam for an ellipsometer.

23. The apparatus of claim 20, further comprising an optical coupler that directs said single light beam into said light beam for an interferometer and said light beam for an ellipsometer.

24. The apparatus of claim 20, wherein the light source is a laser that generates a collimated monochromatic light beam.

25. The apparatus of claim 20, wherein the light source comprises one or more lamps.